Conceptual framework and theoretical development on CLV Research

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***Abstract*—As the customer relationship management is highly recognized by more companies and has put it into practice, how to have a full life cycle management of targeted business customers have become the actual customer management issues for common concern. The definition of customer lifetime value, qualitative and quantitative studies in this paper were retrospectively analyzed and summarized, the analysis of customer lifetime value model of the current situation and existing deficiencies were made and from various angles the direction of future research which further clarify the customer lifetime value for the important role of enterprises, and relevant research findings will be used to provide information to verify and expand in the context of the market.**

Keywords—Customer Value; CLV; Customer Relationship Management; Customer life cycle; customer lifetime value model

I. INTRODUCTION

Customer Lifetime Value is the corporate customers to maintain customer relationships during the entire process of creation from the present value of all profits. It reflects the customer directly to the enterprise value. It is the customer relationship management arm of the study, to quantify the long term, tracking and analysis of customer value for the enterprise, also predict the future to bring the expectations of our customers value. Currently in many industries such as telecommunications companies, retailers and banks and so on, more and more emphasis is put on customer information and transaction data collection. Enterprises can find out from the collected valuable information, such as who is the company's key customer, their consumption behavior, consumption time interval. Customer-centric marketing concept has gradually been accepted by each enterprise, more and more enterprises want to train customer with long-term relationships for companies to create more sales and make more profits, how to increase customers in the enterprise life cycle and how to increase the customers in this life cycle value for those enterprises that need more and more attention.

Customers can bring the value of the business community and academia being the focus of attention and the focus of the study more on customer lifetime value that enhance customer lifetime value, which is the customer relationship, an important way to value growth. But in fact, the contribution of the enterprise customers much more than that, the customer brought about by the customer referral value is often ignored by researchers. And often recommend clients to bring value to the enterprise customer business which is far greater than the direct purchase behavior, ignoring the indirect purchase of the value of customer behavior is unwise. Therefore, CLV and CRV-depth study of the impact on business and how to enhance the value of customer relationships is especially important.

This paper reviews the theory of the formation of customer lifetime value, and the development of qualitative and quantitative studies of some representative literature, summed up their innovation and the possible extension of the hope of identifying future research directions.

II. CUSTOMER LIFETIME VALUE THEORY

STP, 4PS and other marketing ideas on promoting the development of marketing theory has played a catalytic role, but most are focused on products, quality and other factors rather than customers. But as more and more enterprises pay attention to the important role of the customer, they will gradually develop marketing concept of "customer oriented "in how to win customer satisfaction and loyalty. Until the 90's the introduction of the concept of customer value, marketing ideas were pushed to a new level.

Woodruff proposed the company only made it available to the customers with more value than the competitors, which is excellent customer value to maintain loyal customers. Customer value has become a common academic and business focus, which is regarded as a new source of competitive advantage.

Marketing strategy based on customer consists of two aspects:

(1) To provide business value to customers. This is from the customer point of view, the main customer for the value of the experience, business experience for the value of the object. From economic perspective, the business value for customers is to provide products and services, customer value based on its own evaluation criteria and identification value, which is the traditional sense of customer value. The customer value and the present results are the most abundant and in-depth field. The value of marketing in the formulation of a typical customer delivered value and customer identification value, which are the main indicators to measure customer satisfaction.

(2) To provide customer value for the enterprise. This is from the business point of view, the main business for the value of experience, customer experience for the value of the object. This value is based on customer behavior and consumer characteristics variables to measure the customers which create value for the enterprise; the customer value measures the relative importance of enterprise customers. The enterprise customer is the important decision-making criteria.

Customer lifetime value of which is the rise of research in recent years, this type of customer value has become the focus of research. Customer lifetime value not only reflects the revenue stream for the contribution of corporate profits, but also explicitly obtains the deduction of the enterprises to pay for the cost of revenue stream。The importance is customer lifetime value customers fully expect future long-term growth potential of enterprises so that to objectively and comprehensively measure the overall value of the enterprise customer. Currently, the customer lifetime value as an important basis for business decisions both in academia and the business world are gradually been acknowledged.

CLV describes the dynamics at different stages of customer relationship in term of general features. This definition not only avoids the "life cycle" caused by the unclear fuzzy definition but also achieves the customer lifetime value assessment of the dynamics timely.

A. The theory of the formation of customer lifetime value

Stages of Customer life cycle are classified on the basis of the customer life cycle, the current research made in this area is numerous，Dwye and Schurr（1989）made a representative research to put forward the stage of buying and selling relationship in the trading model. It is at first time explicitly stressed that the development of trade relations is a significant characteristic stage. The development of customer relationship can be divided into development stage, formation, stable, degradation etc. At the same time, scholars divided the value of each customer into three parts: historical value, current value and potential value.

Customer lifetime value theory emphasizes the importance of keeping customers, the loss of a customer will make a loss of the life value. Companies need to establish the concept of relationship marketing, with long-term, overall strategic vision, regarding the customer relationship management as an asset. Companies need to pay attention to customer life cycle, changes of stages. The determination of what type of relation with customers is not made only by looking at the immediate value. Customer lifetime value is not the same in different periods, and companies need to always pay attention to the impact of its business. Although it is difficult to accurately predict customer behavior, through the analysis of customer lifetime value, companies can identify relative importance and relative attractiveness of different customers or different customer groups. Thus to establish such a marketing strategy for the enterprise is more scientific and commercial for decision-makings.

Customer Lifetime Value is the customer throughout the life cycle, the customer brings the net present value of corporate profits. The important role of CLV in the enterprise is self-evident. Therefore, at present most of the history of corporate customers to buy is only the value of statistics to estimate the future value to arrive at the CLV, based on which is according to the 80/20 rule to divide the customer and category management.

80/20 based on the principle of segmentation is also based on the value of customer purchase history, although the 80/20 principle is relatively simple and fast to implement, but its fatal weakness is the lack of dynamic development considerations, not really accurately measuring CLV, in particular in:

The biggest drawback of purchase value of history to measure the contribution of the enterprise customer is: ignore the customer's potential value. 80% are corporate customers, does not mean that low-value customer. Used as criteria to give up the marketing of such customers, not only upfront development costs could not be recovered, but also the valuable customer is away to competitors. In fact, many customers are "flexible customer ", they are not worthless, but excavated.

Another disadvantage is that the future cannot be given to the development of customer objective assessment, is a typical short-sighted behavior. It has only stressed the contribution of the enterprise customer, ignoring how the continuous improvement to its customer value, it is easy to give up potential customers. With the accumulation of customer experience, improvement of education, enrichment of social relations and their value will be changed. Although some customers is not the high-value customers, but have good prospects in growth and development ability, if companies can adhere to their attention, timely provision of appropriate services, and cultivation of their loyalty and the customer value will rise.

B. Theoretical Development of Customer Lifetime Value

In customer relationship management, customer value is the fundamental basis for customer segmentation. Many studies were conducted about the customer value. On the research of customer value, Cartwright first proposed concept of "customer lifetime value" that the existence of the lifetime value of customers is a cumulative effect.

The first application of customer lifetime value is in direct marketing because the forecast CLV complete historical transaction data needed to track and understand customer behavior and the direct marketing is the first relatively complete customer database within the field. Currently CLV is increasingly being applied to the field of general marketing, because with the rapid development of IT technologies, many companies begin to have more complete data including transaction data, customer data. The client is possibly and easily tracking and understandable behaviours which cannot be achieved in the past. How to understand customer lifetime value (CLV), foreign scholars are given different definitions, see (TABLE I) ：

III. CUSTOMER LIFETIME VALUE RESEARCH MODEL

A. Consider the net present value of the CLV model

Barbara bond Jackson（1985）laid the customer lifetime value measurement basis of the study, gives the measure of NPV based on customer lifetime value measurement model. This model assumes that all cash flows are generated in the end, only taking into account the ongoing business relationship with enterprise customers, not taking into account the past and possible future clients, ignoring the acquisition costs, not taking into account the nature of the buying process

is a random phenomenon, Thus, this model is strict in theory, there are many assumptions of its practical value.

TABLE I THE DEFINITION OF THE VALUE OF CUSTOMER LIFE CYCLE EVOLUTION

From	Definition
Dwyer（1989）	enterprise customers to maintain customer relationships in the entire process which create profits from the present value in all benefits
Roberts and Berger（1989）	For customers in the future the contribution of management fees and net present value profit
Jackson（1994）	Customer management cost and profit contribution of the net present value of future
Courtheoux（1995）	Expected future profits available to customers on the net present value of the contribution and management fees
Bitran and Mondschein（1996）	Throughout the life cycle of the customer, the customer brings the net present value of corporate profits
Blattberg and Deighton（1996）	Minus the expected revenue from customer relationship management customer and the cost of consuming
Berger and Nasr（1998）	throughout the life cycle of Customers transactions with the enterprise bring the enterprise's net profit or loss
Roland Rust、Valarie Zeithaml and Katherine Lemon（2000）	An organization's customers (ie, the object of their services) in their life and use of the institution in order to enjoy products and services provided to the agency and to pay the sum of the returns
Mohanbir Sawhney（2002）	A customer in the future can provide a sum of direct costs and net present value of profits, taking into account the future profits, the value of enterprise customers.
Gupta and Lehmann（2003）	Customer value generated by the present value in the future

But the most advantage of this model is simple, easy to understand and apply.

B. CLV model considering the loss of customers

Dwyer (1989) Improved Barbara Bond Jackson (1985) the application of direct marketing for the client, according to differences in the behavioural characteristics of two types of customers, the developed two types of customers respectively, loyal type of customer and non-loyal type of customer in the CLV prediction model, in the customer retention model, and customer migration model. Among them, the non-loyal customers can be purchased at any time to adjust and to deal with the share of each seller; and loyal customer of a seller-based long-term deal, so switching cost is high. However, Dwyer did not give them the mathematical model.

Paul D. Berger, Nada I. Nasr (1998) and according to Barbara Bond Jackson (1985) the type loyalty and non-loyal customer in the action established the CLV model. The model fits historical data to derive customer segmentation period profit function, then a fixed rate of customer retention continually derived discrete transaction value of customer transactions. Expressed mathematically as follows:

For the discrete transactions:

$$CLV = \sum_{t=0}^{g} \pi_1(t) \times r^t \times (1+\mathrm{d})^{-t} + \sum_{t=g+1}^{n} \pi_2(t) \times r^t \times (1+\mathrm{d})^{-t}$$

$$\pi(\mathrm{t}) = \pi_1(\mathrm{t}) = ht^2 + v \qquad \mathrm{t} \le g$$

$$\pi(\mathrm{t}) = \pi_2(\mathrm{t}) = \pi_1(\mathrm{g}) + \left[N(1-e^{-t+g})\right] \qquad \mathrm{t} > \mathrm{g}$$

$\pi_1(t)$、$\pi_2(t)$ were two stages in the customer life cycle, the profit function.

For continuous trading was：

$$CLV = \int_0^g \pi_1(\mathrm{t}) \cdot r^t \times (1+d)^{-t} d_t + \int_g^n \pi_1(\mathrm{t}) \cdot r^t \times (1+d)^{-t} d_t$$

Phillip E. Pfeifer, Robert L. Carraway (2000) in the Paul D. Berger, Nada I. Nasr (1998) CLV model, based on the period of five stages that the transfer process is a Markov process, proposed transfer process based on Markov Chain Model, to be used to simulate the relationship between businesses and their customers. Markov CLV model not only describes more flexible Berger and Nasr (1998) model under the situation but also maintains the customer relationship model of customer switching. In the previous model, if a customer buy again not in a long time, companies are thought to have lost the customer, and once again put him as a new enterprise customer. Conversion is the customer cannot consume within certain period of time, customers purchase again viewed as a returning customer.

But the Markov assumption CLV model is very demanding, all our customers' buying time is considered to be the same or fixed, while the possibility of customer switching is critical for the application of the model, but this model is indeed difficult to measure.

C. CLV customers consider the cost model

Robert E. Wayland, Paul M. Cole. (1997) introduced in the CLV model the customer purchase rate parameter, which used to represent each client in the future possibility of purchasing at the same time. The customer awareness, the cost of

maintaining and developing separate net income from the customer, highlighten the relationship between the guide business investment which may impact on the CLV, the formula into:

$$\mathrm{CLV} = \sum_{i=1}^{n} GC_i \cdot \Pr(1+d)^{-i} - \sum_{i=1}^{n} (R_i + D_i) \cdot (1+d)^{-i} - A$$

Where, GC_i said that the first i-year gross profit; Pr (i) that customer i in the probability of purchase; A cost that customer awareness; R and D, respectively, the first i customers in the year the cost of customer retention and development, But the rate of introduction of customer purchases did not study how to determine the parameters.

Francis J. Mulhern (1999) to purchase from the customer to pay the cost of time and number and model number on the further refinement.

$$\mathrm{CP_i} = \sum_{i=1}^{r} \frac{\sum_{j=1}^{j_i} (p_{ijt} - c_{ijt}) - \sum_{k=1}^{k_i} mc_{ikt}}{(1+\mathrm{d})^t}$$

CP_i for the i-to-business customer profit contribution; p_{ijt} for the i customers in the first j time periods the purchase price; c_{ijt} to i customers in the first j time period t unit cost of purchase; J_i to i customers in the period a total of t the number of purchases; mc_{ijt} for the first time i customers in the t k-variable costs incurred by service; K_i for the i customers in the number of hours of total service; d is the discount rate.

D. Consider the model of customer retention of the CLV

Calciu Mihai, Francis Salerno (2002) a combination of Paul D. Berger, Nada I. Nasr (1998) and F. Robert Dwyer (1997) of the CLV model proposed a comprehensive extended model, calculated by using the method and matrix algebra to be a customer retention model, a comprehensive customer migration model. However, the cumulative retention rate of its customer and the purchase rate is still calculated by the analysis of historical data of customer, and is monotone decreasing, it applies to a typical calculation of the value of customer life cycle.

V. Kumar, Girish Ramani, Timothy Bohling (2004) proposed the CLV-based customer base mean model:

$$CLV_k = \frac{1}{(1+d)^k} \left\{ \sum_{t=k}^{\infty} \left[\frac{(GC-M)}{(1+d)^{t-k}} r^{t-k} \right] - A \right\}$$

Which, CLV_k customer base is the mean k, k a customer base for the first customer base into the slot, GC and M are the average gross profit contribution of customers and marketing costs, r for the customer retention rate, d the discount rate, A cognitive costs to customers.

Above formula reflects the impact of customer lifetime value, primarily includes three factors: customer profit margins, customer retention rate, the discount rate.

E. Consider the prediction of CLV model of individual customers

David C Schmittlein, Donald G Morrison and Richard Colombo, a prediction model of customer transactions group, referred to as the SMC model. This model is mainly used to predict the future for any individual customer transactions within a period of time (the number of purchases expected). David earlier worked on the improvement, adding the average customer transaction volume in the next time the forecast model and comprehensive pre-models, by any individual customer in the next period of time transacts the expected trading volume. Reinartz use of customer purchase activity is analysed to study the duration of the customer life cycle. In China, Qi based on the SMC model, established right-censored model of customer life cycle time, thereby improving any individual customer life cycle time model, and the SMC model, the number of clients in future transactions model built with the expectation of individual customer lifetime value models.

Although measurement of customer lifetime value in theory by the domestic and foreign scholars has been extensively studied and explored, in practice it is used to measure customer lifetime value and the estimation are difficult. CLV is used mainly because the current measurement method is not applicable.

IV. Summary and Outlook

Customer value is always a hot research topic as customers research is difficult. Marketing Science Institute has put forward "customer value" as the priority areas of research for many years; the United States has two important business marketing agency - business marketing, market research and business center which make industry comprehensive study of customer value in their research programs. In this paper, the concept of customer lifetime value targeting meaning and application problems, however, since the relevant research work has carried out recently, the total research field is still at the exploratory stage, many issues need to be studied and solved. To the end, it should be focus on customer lifetime value of the future direction of the theory to deepen the research on customer lifetime value.

Customer lifetime value should concern about the future direction of the theory to deepen the research. Each industry has different characteristics, so that it is worth to explore the topic for different industries to develop the corresponding value of customer life cycle model. The current model is applied only in the telecommunications industry, banking, insurance, traditional retail, emerging industries. For example, the context of network transactions of the customer lifetime value is also of great significance, online trading is a new trading model and it is bound to affect the subjective evaluation of customer value. Customer life cycle characteristics of the various stages of change will make follows. E-business is a new trading model which tends to affect the assessment of customer value, and the features of all

customer life value stages will change accordingly. Therefore, the research on customer life value need to be further improved and developed.

ACKNOWLEDGMENT

This paper is funded by the National Natural Science Foundation of China (Grant No. 70532006) ，Humanities and Social Sciences project (10YJC630065) ，For New Century Excellent Talents Program （2006） of funding.

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